

In the Claims

1. (Currently amended) An apparatus for securing an inner vessel having a bottom and a side wall and an outer vessel having a bottom wall and a side wall, within a cryogenic system, said inner vessel adapted to be enveloped by said outer vessel, wherein a vacuum may be maintained between the outer vessel and the inner vessel, said apparatus comprising:

at least one bottom-support component having at least one mating structure;

wherein said mating structure comprises at least one mating pair of one male-adapter and one female-receptor;

wherein one part of said mating pair is secured to the bottom of inner vessel while the other part of said mating pair is secured to the inner bottom of the outer vessel;

wherein said bottom-support component is adapted to hold the inner vessel at a position [elevated]elevated from the inner bottom of the outer vessel under a compression force;

wherein the inner vessel is prevented by said bottom-support component from horizontal and lateral movements.

2. The apparatus as recited in claim 1, further comprising at least one side-support component:

wherein said side-support component comprises at least one mating structure;

wherein said mating structure comprises at least one mating pair of one male-adapter and one female-receptor;

wherein one part of said mating pair is secured to the outer side wall of the inner vessel while the other part of said mating pair is secured to the inner side wall of the outer vessel;

wherein a fastening mechanism is employed to prevent relative rotational movements of the two parts of said mating pair, about a vertical axis near the geometric center of the outer vessel; and

wherein the inner vessel is prevented by said fastened side-support component from rotational movements about a vertical axis near the geometric center of the outer vessel.

3. The apparatus as recited in claim 1, further comprising at least one side-support component:

wherein said side-support component comprises at least one mating structure;

wherein said mating structure comprises two female receptor parts and one connecting pin-like element;

wherein one female receptor part of said mating structure is secured to the outer side wall of the inner vessel while the other female receptor part of said side-support mating structure is secured to the inner side wall of the outer vessel;

wherein a fastening mechanism is employed to secure at least one end of the connecting pin-like element of said side-support mating structure to prevent relative rotational movements of the two female receptor parts of said side-support mating structure, about a vertical axis near the geometric center of the outer vessel;

wherein the inner vessel is prevented by said fastened side-support mating structure from rotational movements about a vertical axis near the geometric center of the outer vessel.

4. The apparatus as recited in claim 1, wherein the cryogenic system is a high-temperature superconductor device system.

5. (Currently amended) The apparatus as recited in claim 1, wherein the cryogenic system uses liquid nitrogen [as the main cooling medium]for cooling.

6. (Canceled)

7. (Canceled)

8. (Currently amended) An apparatus for securing an inner vessel and an outer vessel, within a cryogenic system operating at cryogenic temperatures, the inner vessel adapted to be enveloped by the outer vessel, wherein a vacuum may be maintained between the outer vessel and the inner vessel, said apparatus comprising:

mating structure means coupled in compression with the inner vessel and the outer vessel for preventing rotational movement of the inner vessel about a vertical axis with respect to the outer vessel; and

mating structure means for preventing axial movement of the inner vessel with respect to the outer vessel.

9. (Canceled)

10. (Currently amended) The apparatus as recited in claim 8, wherein said mating structure means for preventing rotational movement is a square peg and corresponding square peg leg securing means.

11. (Canceled)

12. (Currently amended) The apparatus as recited in claim 8, wherein said mating structure means for preventing axial movement is a fixed pin-like locking structure.

13. (Canceled)

14. (Canceled)

15. (Currently amended) An apparatus for securing an inner vessel and an outer vessel, within a cryogenic system operating at cryogenic temperatures, the inner vessel adapted to be enveloped by the outer vessel, wherein a vacuum may be maintained between the outer vessel and the inner vessel, said apparatus comprising:

leg means for preventing rotational movement of said inner vessel about a vertical axis with respect to the outer vessel, wherein said leg means is a square peg and corresponding square peg leg securing means, wherein said leg means is coupled in compression with the inner vessel and the outer vessel.

The Examiner has required Applicant to elect a single disclosed species under 35 USC 121 for prosecution on the merits from groups I, II, III, and IV. The Examiner has withdrawn claims 6, 7, 9, 11, 13, and 14 from further consideration, as being drawn to a non-elected invention under 37 CFR 1.142(b). The Examiner has objected to the drawings. The Examiner has objected to claims 2 and 3 because the bottom support in combination with the side support has not been shown in the drawings. The Examiner has objected to claims 1-5 because the word "elevated" is misspelled in line 12 of claim 1. The Examiner has rejected claims 5, 10 and 12 under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Examiner has further rejected claims 1-4, 6, 8, and 12 under 35 USC 102(b) as being anticipated by US Patent 4,481,778, hereinafter entitled "Reinker." The Examiner has further rejected claims 8 and 12 under 35 USC 102(b), over US Patent 4,487,332, hereinafter entitled "Huang." The Examiner has further rejected claims 10 and 15 under 35 USC 103(a) over Huang in view of US Patent 5,873,762 hereinafter entitled, "Chazal." In regard to claim 5 the Examiner has taken official notice that liquid nitrogen is a well know cooling medium.

Reinker discloses a support for a cryogenic container, particularly adapted for use in spacecraft, which provides a dual support structure. One portion of the structure supports the container in the absence of acceleration force, and the other portion of the structure supports the container in the presence of acceleration forces. The support includes a first connector means and second connector means. A first support extends between the first and second connector means. The first support is adapted at its end for structural engagement and support of said first and second connector means. A second support also extends between said first and second connector means. The second support has a degree of elasticity, and provides support of said first connector means from said second connector means in the presence of normal forces imposed by the container and its contents. The second support is deformable in response to forces significantly in excess of the normal gravitational forces imposed by the container and its contents and permits the structural engagement of the first support with the first and second connection means.

Huang discloses a cryostat of the type having nested vessels wherein a plurality of rigid spacer stubs are secured between the vessel walls of adjacent vessels. The spacer stubs are mounted on the wall of an inner vessel to extend axially outwardly. A plurality of stub caps are

secured to the adjacent vessel wall of a next outer vessel, with each stub cap having a recess designed to retain one of the spacer stubs therein. Each spacer stub engages its respective stub cap and is retained within the recess thereof when the walls of the nested vessels are at substantially the same temperature to uniformly and rigidly space apart the vessel walls of the nested vessels. When the vessel walls thermally contract because of the introduction of low temperature liquefied gas into the inner vessel, each of the spacer stubs is withdrawn from its respective recess a distance sufficient to disengage said spacer stub and stub cap.

Chazal discloses a playing structure comprising a plurality of playing structure modules, wherein said modules comprise in part, a retainer to couple a pair of adjacent playing structure modules having support frames to inhibit relative movement between the playing structure modules. The retainer may be a generally rectangular ring formed of semi-rigid plastic material. The side walls of the retainer are dimensioned to be approximately equal to the depth of the recesses.

The Specification has been amended to recite possible governmental license rights in this invention. This invention was made, in part, under Contract No. DE-FC36-03G013033 awarded by the Department of Energy. A new paragraph inserted before paragraph [0001] has been added as required under 37 CFR 1.77. Also new paragraph numbers were added so that each paragraph in the Specification was numbered as required under 37 CFR 1.71. No substitute Specification is required under 37 CFR 1.125. No new matter has been added to the Specification.

The Examiner has required the Applicant to elect a species and all the claims readable thereon. The Applicant elects group I species, (Figure 4(a)), including claims 1-5, 8, 10, 12 and 15, and hereby cancels claims 6, 7, 9, 11, 13 and 14.

Proposed drawing updates showing corrected Figures 6 and 7 are presented to illustrate the bottom support in combination with the side support as recited in claims 2 and 3. In particular, Figure 6 has been corrected to include the bottom support structure recited in claim 1. Figure 7 has been corrected to show a inner vessel and an outer vessel with side-support structure recited in claim 3 and bottom support structure recited in claim 1. No new matter has been added. Formal drawings will be provided upon acceptance of the proposed drawings. The Specification has been amended to more accurately describe the corrected drawings of Figures 6 and 7 (paragraphs [0006] and [0007] respectively). Replacement paragraphs [0006] and [0007]

have been provided. No substitute Specification is required under 37 CFR 1.125. No new matter has been added to the Specification.

Claims 1, 5, 8, 10 and 12 have been modified to recite with particularly applicants' invention. In particular, the word "elevelated" in claim 1 has corrected to recite "elevated." In claim 5, the phrase "as the main cooling medium" has been cancelled and replaced with "for cooling." Support, for example, can be found in the Specification at paragraph 17, lines 1-4. Claim 10 has been modified to add the phrase "for preventing rotational movement" and claim 12 has been modified to add the phrase "for preventing axial movement" to clarify the proper antecedent basis for "said mating structure means" in both claims. Support, for example, can be found in the Specification at paragraphs 19, lines 1-6 and paragraph 21, lines 12-15. Consequently, Claims 1, 5, 10 and 12 have been corrected thus obviating the basis for the 112 rejection.

The Examiner has rejected claims 1-4, 6, 8 and 10 under 35 USC 102(b) as being anticipated by Reinker. Reinker does not teach or suggest a bottom support component coupled directly to the bottom surface of the inner vessel and coupled between the inner vessel and outer vessel in compression as in Applicants invention. Rather Reinker teaches a side mounted support structure comprising in part a member in tension with the bottom side of said inner vessel for the purpose of being deformable in response to forces significantly in excess of the normal gravitational forces imposed by the container and its contents during acceleration. See for example, Reinker column 2, lines 29-41. Whereas, in the present invention, gravitational force caused by the mass of the inner vessel will bear down on the bottom support and thus cause said bottom support to have a compression force between the inner and the outer vessel of the present invention but not a tension force. See, for example, paragraph 17, lines 7-9 of the Specification. Accordingly, a limitation has been added to claims 1 and 8, which recites the compressive forces on the bottom support which is coupled to the bottom of the inner vessel. Since claims 2-4, and 10 all depend from now amended claims 1 and 8 they are likewise not anticipated by Reinker. Claim 6 has been cancelled. Consequently, the present invention as recited in claims 1-4 and 8 is not anticipated by Reinker thus obviating the current rejection under 102(b). It is believed that newly amended claims 1-4, 8, and 10 are now in condition for allowance.

The Examiner has rejected claims 8 and 12 under 35 USC 102(b) as being anticipated by Huang. Huang does not teach or suggest the use of a fix pin to secure said inner vessel to said outer vessel while the apparatus is operating at cryogenic temperatures, as recited in newly

amended claim 8 and 12. Rather Huang teaches that the pins (spacer stubs) are movable and move out of the recess during cryogenic cooling to eliminate heat conduction paths. It is believed that claims 8 and 12 are now in condition for allowance.

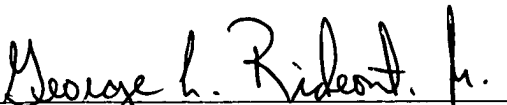
The Examiner has rejected claims 6, 10 and 15 under 35 USC 103 (a) as being unpatentable over Reinker in view of Chazal. Neither Reinker or Chazal teaches or suggests a bottom support component coupled directly to the bottom surface of the inner vessel and coupled between the inner vessel and outer vessel in compression as in Applicants invention. Rather Reinker teaches a side mounted support structure comprising in part a member in tension with the bottom side of said inner vessel for the purpose of being deformable in response to forces significantly in excess of the normal gravitational forces imposed by the container and its contents during acceleration. Whereas, in the present invention, gravitational force caused by the mass of the inner vessel will bear down on the bottom support and thus cause said bottom support to have a compression force between the inner and the outer vessel of the present invention but not a tension force. Accordingly, a limitation has been added to claims 15, which recites the compressive forces on the bottom support which is coupled to the bottom of the inner vessel. Claim 6 has been cancelled. Claim 10 depends from claim 8 which is believed to be in condition for allowance thus obviating the rejection of claim 10. Consequently, the present rejection of claims 10 and 15 under 103 (a) is obviated. It is believed that claims 10 and 15 are in condition for allowance.

The Examiner has taken official notice that liquid nitrogen is a well known cooling medium. However, the Examiner has not proved any recitation identifying a well known cooling medium, as such, the Applicant respectfully traverses such official notice. However, it is believed that claim 5 depends from allowable subject-matter in claim 1 and, as such, is in condition for allowance.

It is therefore, requested that the present patent application now be allowed.

Respectfully submitted,

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